

trained social psychologist to enter caveats at every possible point, most of them well made. But the book has suffered throughout from the unsystematic inclusions of such variables as culture—in the sense of the specific culture of a given tribe—the social situation, both in macrocosms and microsomic terms, and the general disjuncture between the minute analyses of a large number of detailed and inconclusive results and ambitious set of very general hypotheses. Although the material is too fragmentary to be anything but suggestive, it does reinforce the very strong probability that a continuum from uncivilized to civilized, even though it expresses the views of the industrialized West and the aspirations of most of the people in the world, is not a satisfactory frame of reference. Both individual cultures and individual social systems and particular situational analyses are needed as mediating variables.

The book is raw material on the confusion about the undefined boundaries between anthropology, sociology, and social psychology, when any one of the three disciplines attempts to deal with sociocultural change.

MARGARET MEAD
American Museum of Natural History

A History of Mechanics. René Dugas. Translated by J. R. Maddox. Editions du Griffon, Neuchatel, Switzerland (Central Book Company, New York), 1955. 671 pp. Illus. \$15.

Mechanics in the Seventeenth Century. René Dugas. Translated by Freda Jacquot. Editions du Griffon, Neuchatel, Switzerland (Central Book Company, New York), 1958. 612 pp. Illus. \$15.

A natural reaction to any new book on the history of mechanics is to compare it with Ernst Mach's work, which first appeared in 1883 and which is now a historical document. Mach's arrangement was topical, and his discussion of meaning was directed toward a philosophy of knowledge. In *A History of Mechanics*, Dugas is more purely historical. "We have preferred here to follow the elementary order in time" (page 12). In the foreword, Louis de Broglie states the difference in these words: "Certainly, the reading of Mach's book, so full of original ideas and profound comments, is still ex-

tremely instructive and absorbing. But Dugas' history of mechanics has the advantage of being less systematic and more complete" (page 8). Mach presented us with a textbook of mechanics based on its history; Dugas provides a well-selected and copiously annotated sourcebook. Almost one-third of it is devoted to developments in this century. Here, Dugas changes his method and divides each chapter into two parts: presentation, and analysis and interpretation.

The task of the translator must have been quite difficult, and in some places it was too difficult for him. This may diminish the reading pleasure, but leaving obvious criticism aside, it may also induce attempts to substitute better versions: for example, for the very last sentence of this book: "Poincaré thus gave his adhesion to the theory of relativity" (page 650).

In *Mechanics in the Seventeenth Century*, Dugas expanded, about sixfold, part 2 of his earlier volume, but the multiplication is not uniform. Thus, Descartes now is given 85 pages against 15 in the previous volume; Newton almost 100 against 18; and Leibniz about 60 against only 3. Dugas admirably carried out his intention to give "not . . . science romanticized, but the romance itself of science" (page 15). He did not even write separate biographical notes, but lets the character of the authors reveal itself in quotations and polemics. The spirit of the 17th century comes alive in the words of these men and in the description of their experiments. We experience "the romance itself of science" when we read about Pascal's experiment with glass tubes that were 40 feet in length (page 211), and we try to visualize how he handled them, one filled with water, the other with wine, to build his barometer which was attached to the mast of a ship.

Naturally, the story could not be strictly confined to the 17th century. A glimpse of the antecedents and of the radiations into the next century was necessary.

What Louis de Broglie says about this book is valid for its companion as well: "It will appeal not only to those who love the history of science, but to all those who are interested in the painful but magnificent processes of the human mind in its search for truth" (page 11).

EDUARD FARBER
4530 Brandywine Street, NW,
Washington, D.C.

Galileo and the Scientific Revolution. Laura Fermi and Gilberto Bernardini. Basic Books, New York, 1961. x + 150 pp. Illus. \$3.50.

The Watershed. A biography of Johannes Kepler. Arthur Koestler. Doubleday, Garden City, N.Y., 1961 (available to secondary school students and teachers through Wesleyan University Press, Columbus 16, Ohio). 280 pp. Illus. \$0.95.

Michelson and the Speed of Light. Bernard Jaffe. Doubleday, Garden City, N.Y., 1961 (available to secondary school students and teachers through Wesleyan University Press, Columbus 16). 197 pp. Illus. \$0.95.

Faraday as a Discoverer. John Tyndall. Introduction and notes by Keith Gordon Irwin. Crowell, New York, 1961. xvii + 215 pp. Illus. \$2.75.

The Fermi-Bernardini volume on Galileo is a delightful and remarkable product of the revolution occurring in our own day, under the impact of such science historians as I. B. Cohen, Marshall Clagett, Anneliese Maier, and A. C. Crombie, in the mode of approach to the history of science. *Galileo and the Scientific Revolution* is as fresh and invigorating a work in the field of science biography as was its hero in his day in the fields of physics and astronomy. It may well be regarded as the first sound, objective, and truly analytical evaluation of a great mind that left its mark on history by giving it two twists—one in the realm of motion which cleared past confusions, the other in the employment of the telescope which opened up vast horizons. Gone is the old and naive, teleorationalist conception of man's road to scientific knowledge upon which strode determinedly the lowly but just seekers after truth, only to be badgered and mocked by the demonic agents of evil. As this little book so lucidly and concisely relates, the actual road is far more complex than that, more beset with unseen bumps and curves, yet far more intriguing and fascinating than the simple-minded portrayals of the past indicate.

The book is charmingly written in simple, direct, and absorbing style, without fanfare or emotionalism, thus placing the burden of both drama and judgment upon the reader's enriched and stimulated mind. It adheres strictly to the facts securely established, avoiding such juvenile pitfalls as the postulation of trickeries or forgeries with which to explain away deep-seated

fountainsprings of human conflict and disharmony. This book is indeed a great achievement not only as a biography of a man consistently mishandled in the past but also as an approach to biographical writing in general. It is not meant to be an exhaustive or definitive study, but it presents an excellent overview of all the acts in the rich Galileo drama.

The Watershed is a reprint of the section on Kepler in Koestler's larger *Sleepwalkers*, which appeared in 1959. It is the liveliest, most scholarly, and best part of that excellent work, and it may well go down in history as the keenest pioneering achievement in depth analysis of a scientific genius, as well as of the nature of progress in science. By utilizing his great gifts as literary master and his powers of insight into the recesses of the human mind in the throes of conflicting beliefs and loyalties, Koestler succeeds in laying the foundation for a new psychology of science, fashioning it into a discipline that combines dissection of the personality of the scientist, the culture of the time, as well as the salient ideas seeking to enter the web of prevailing beliefs, and the diverse interplay of all these factors. The result of this technique is tremendous in its power, and the light it sheds proved to be so brilliant that many pedants in the field were blinded by its glare.

The Watershed makes most fascinating reading. Koestler shows such vast knowledge of the subject, both historically and scientifically, that one doubts whether much can be added. The reader will never forget the other-worldly charm of Kepler, the depths of his feverish brainstorm, the scope of his creativity, and finally the element of historical irrationality in scientific progress, which irritated so many of Koestler's critics, and the bewildering cross-currents of thought that shaped the womb of the scientific revolution. This is a great book, a landmark in biography which no student of science or history can afford to postpone reading.

By comparison with these two biographies, Jaffe's book on Michelson seems run-of-the-mill. It is, however, an honest and thorough account of the life and work of a great physicist; it is well written, readable, and free from biographitis, if one may so describe the needless hawking which often afflicts worshipping biographers.

The reprinting of Tyndall's work on

Faraday is a happy symptom of the revival of interest in the full scope of the history of science. As Faraday's associate and successor to the superintendency of the Royal Institution of London, Tyndall discusses primarily Faraday's vast and basic contributions to science in his unique manner, famed for lucidity. His few anecdotes of his personal relations with Faraday help considerably to enliven the portrait of this key figure in modern physics.

MARK GRAUBARD
*Natural Science Program,
University of Minnesota*

Sahara, Desert of Destiny. Georg Gerster. Translated by Stewart Thomson. Coward-McCann, New York, 1961. xi + 302 pp. Illus. + maps. \$5.

Gerster's *Sahara* is a prize package of its kind. An awesome mass of factual information, sparingly sprinkled with misinformation, is presented so skillfully that the book is as enjoyable to read as a good novel. Unfortunately, in the sections dealing with prehistory and native customs, fact is mixed indiscriminately with fantasy. Specialists will heave many a weary sigh as they encounter tediously obsolete and confused theories concerning rock paintings and camels, the Hyksos and the Garamantes, the feudal matriarchal free-loving Tuareg and such. Arabic words often defeat the author utterly. For example, *Sah'ra* does not mean "mouse-coloured" but "a desert habitable in spots," a *Gandourah* by definition cannot have a hood, and *Davel Askri* is certainly a strange rendering of *Dar el Askri*. Curious factual errors occasionally creep in too. It is stated that "the early palaeolithic" only "goes back some eight to fifteen thousand years" although "the Early Stone Age" may go back "hundreds of thousands"; Rene Caillié (misspelled Caillé as usual) is said to have been "the first European to reach Timbuctoo"; and so on.

But all of this is relatively unimportant. The immediate future of the Sahara is a matter of rapidly increasing urgency because of the major roles that Moslem Africa and the Mediterranean are beginning to play in the struggle for survival of the West. In this context Gerster shines as a singularly penetrating political and economic analyst.

Water is, of course, the main thing in the Sahara. Obviously even the most primitive native communities cannot live without it, while oil drilling installations consume such enormous quantities that they depend on the discovery of new and practically inexhaustible reservoirs of water. This situation poses a whole series of problems which are clearly explained and discussed most entertainingly.

The bulk of Gerster's book is devoted to the consideration of these and other natural resources. Search, discovery, and exploitation are described minutely and as painstakingly evaluated, all in an easy-flowing style that makes them fascinating. And if the author hasn't heard that the discovery of diamonds near Silet was a hoax, it hardly matters.

Gerster goes on to discuss the impact of modern industrial expansion on native institutions. He closes with a searching and impartial examination of the perilous problems of a near future in which conflicting forces of political aspirations and economic necessity will become increasingly difficult to reconcile.

For students of political science, economics, and human and industrial geography, this book is a real goldmine. Nor can any reader, regardless of prejudice, help but be lost in admiration for the author's forthright and yet charitable objectivity. *Sahara* is a really valuable and palatable contribution in the critical fields of international and inter-religious political economy.

LLOYD CABOT BRIGGS
Peabody Museum, Harvard University

Aedes Aegypti (L.), the Yellow Fever Mosquito. Its life history, bionomics, and structure. Sir S. Rickard Christophers. Cambridge University Press, New York, 1960. xii + 739 pp. Illus. \$14.50.

The yellow fever mosquito, *Aedes aegypti*, is one of the insects most widely known to science. It is not only an easily used laboratory animal, but its great significance in past and present public health problems is undisputed. Sir Rickard Christophers' book comprises, under one set of covers, the most exhaustive treatment of any one insect species ever published, and its subject matter is especially appropriate.